SUPPLEMENT.

The Mining Journal,

RAILWAY AND COMMERCIAL GAZETTE:

FORMING A COMPLETE RECORD OF THE PROCEEDINGS OF ALL PUBLIC COMPANIES.

No. 1824.—Vol. XL. LONDON, SATURDAY, AUGUST 6, 1870. {STAMPED .. SIXPENCE. UNSTAMPED, FIVEPENCE

Original Correspondence.

NOTES ON CONTINENTAL MINING—No. VI.

NORTH GERMANY.

g Coal Contraband of War?" is being asked and answered in the mns of several of our contemporaries. Whatever may be the ion expressed from the judicial view of this question, it is cer- that coal is the secret of a nation's position and strength in the isation of the 19th century; and that, in fact, the victory of wa was but the outward and visible sign of the inward develop- of the coal and iron industries of Prussia. None believe more oughly, or quote with more anxiety, than the French, that world- wned saying of Sir Robert Peel, "L'Avenir est au pays qui uira le plus de Houille," and there can be no doubt that the tacle of the rapid development of the mineral resources of North many has caused France to cast many an uneasy glance across Rhine. But a few years ago and the coal trade of North Ger- y was a feeble and sickly affair—in 1840 the produce was a little 2,000,000 tons, whilst the annual yield at present exceeds 0,000 tons. Before proceeding to speak of the Prussian mines e banks of the Rhine, we must advert to the coal field near the ch frontier, and lying to the south-east of the Moselle. Saar- bids fair to earn a double fame. Having already given its e to one of the important German coal fields, it seems likely to ire less enviable notoriety in connection with the present war. ching along the banks of the Saar, tributary of the Moselle, coal field, like the kindred Belgian district, occupies an immense w of the Devonian rocks. The beds run to an enormous depth, eding even the deepest seams of the Mons basin, according to a ment of M. Von Dechen, who says, "After repeated trials I have d that the lowest strata known in the country of Duttweiller, Bettingen, north-east of Saarlouis, dip 19,406 ft. and 20,656 ft. w the level of the sea." The present yield of these pits is about ,000 tons, most of which, in the absence of any extensive me- rgical operations in the district, is exported across the Rhine, the north-east of France, and even to Paris. These mines are ed exclusively by Government; indeed, it is stated by Her Brit- Majesty's Prussian Consul, in a report on that subject, that in us parts of the country from 150 to 200 distinct beds of coal, senting from 300 to 380 ft. in total thickness, are being worked e State.

arly one-half of the Prussian coal supply is derived from the phalian coal basin. Spreading for about 50 miles along the s Rhine and Ruhr, this district has sprung into almost fabulous ity. The average population of Prussia is 176 to the square while in the basin of the Rhine coal field it is four times that nt. This extraordinary development is undoubtedly due to the proximity of the ores of iron to the locality of the fuel. Along anks of the Rhine are to be seen open works and pits, whence derable quantities of hydrated oxide of iron, brown hematite, y iron ore, and red oxide are obtained. Even in the upper course is tourist-haunted stream wagons of the brown oxide and heaps e appear on the banks, chiefly the right. In this coal basin, h may be taken to be an extension eastward of the Liége and n seams, there are no less than 65 distinct beds, above 20 in. , making an aggregate of 210 ft. of coal, and it is calculated this district can keep up its present output of 8,000,000 tons for years to come. The towns of Dusseldorf and Elberfeld, with adjacent villages, form the centre of this busy scene, where all ranches of the coal and iron trades are carried on in a most etic manner, to which the water communication of the Ruhr Rhine in no small degree contributes.

e third great coal field is that of Silesia, lying to the east of ny. It extends some 50 or 60 miles, and produces about a million

Here, as well as in many parts of Saxony, is found the brown, ovey coal. It is estimated to possess only one-third the heating r of the best coal, but as it lies generally near the surface, and erefore, cheap and plentiful, it forms an important fuel. Various ller patches of coal field occur in Saxony—in the Glane Valley, h produces 50,000 tons, and near Dresden, from which is ex- ed the coal to supply the celebrated smelting and refining works reiburg. The brown coal often occurs in superficial deposits, is easily obtained by open-work, in the same manner as peat is ut on the North of England moors. With respect to this Bovey the general opinion among the German miners is that it is of recent origin, in some cases within the historic period. In a pit Nordhausen, in the kingdom of Hanover, we were shown a por- of such compressed peat, or Bovey coal, which there seemed cient evidence to show had been placed in the pit as timber two dred years before, but which is now, or at least the greater part converted into a brown anthracite coal, snapping with an earthy ture. This instance was held by the mine overseers, who pointed to us the phenomenon, to be a conclusive proof that in certain urable circumstances wood may be changed into brown coal in pace of 200 or 300 years. Notwithstanding the rapid develop- t of the metal trades, and the increased consumption for domes- urposes, supplanting the use of peat and wood, the supply of coal Prussia has far outstripped the demand. The annual yield was the whole of Germany—

In 1862	Tons	16,903,520
1863		18,330,779
1864		21,197,266
1865		25,562,889
1866 (estimated)		27,000,000

that now Germany, or Prussia—for to-day the two names are onymous—can afford to export considerable quantities. But the tance of the Prussian coal fields from the sea board, together with increasing demand from the development of the various metal- gical trades of the country, at present act as a barrier against the ap supply of that most important coal market—ocean steamers. North Germany there are 417 coal pits in operation, and of open ks and pits for the extraction of the Bovey coal 512, giving an ual produce of 18,300,000 tons of coal, and 5,000,000 tons of wn coal. The Bovey coal sells on the bank at an average of 11d., while the price obtained for the coal and slack at the pit rages 5s. 8d. No less than 184,634 persons, as colliers and their ilies, are dependent on this branch of industry.

he iron trade is in a very flourishing condition, though, and partly from the same causes, the tendency, noticed in the last article, of the Belgian trade to favour the formation of large rather than small firms, is here markedly visible. There were, from the last reports, 2,600,000 tons of iron ore, of all sorts, raised annually, and 119 works occupied in the manufacture of pig-iron, turning out a total of 700,000 tons, or an average of 6000 tons for each furnace, and sustaining a population of 23,049 individuals; while 31 works were employed in making castings direct from the furnace.

In visiting some of the more recently erected of these furnaces, we were struck with the perfect adherence to what are regarded in France, Belgium, and the North of England as the best models. There is one feature observable in some of these German blast-furnaces which, so far as we know, is not adopted in England; which is that the charging platform is supported by iron columns, which are made hollow, and utilised to convey away the waste gases from the furnace head. In a blast-furnace recently erected in Saxony, at Elchirchen, we were specially struck with the similarity to those in the neighbourhood of Charleroi; in fact, we were afterwards informed that the furnace was constructed from plans designed in Belgium. The height of the furnace is 56 ft. The height of the boshes is much greater than is usual in English furnaces, being 17 ft. 4 in. from the base. The same care is evident in the thorough admixture of the charge as is so marked a feature in the Belgian process; this furnace being supplied with six openings at the top for the introduction of materials, and for the same reason,—to render the working of the furnace more equable and uniform, and thereby promote the gradual and regular settling of the mass in the furnace, the waste gases are withdrawn by four openings, then joined in one canal, and led off to heat the boilers, and the apparatus for hot blast. The blast is delivered through copper tuyeres, carefully cooled by the circulation of water. These furnaces smelt a rich class of ore, the hematite and ferric oxides from the Erzgebirge, as well as refuse from former rich slags. As in many of the Belgian blast-furnaces, the apparatus for conveying the materials to the furnace-top consists of a vertical hoist, drawn up in slides by a wire-rope, after the fashion of a pit cage.

Prussia possesses 258 forges for puddling and rolling bars and finished iron, with an annual production of 400,000 tons, which sells at the works at an average price of 9*l.* 10s. The long distance the coal and ore have to travel, together with the active demand for iron, which the country can by no means supply as yet, seem to be the causes of the high prices which rule in the iron trade. This scarcity allows of an active import trade from England, which, in 1868, was reported at 300,000 tons of wrought-iron. In the Prussian forges 50,000 people are employed at 254 iron foundries, making fine castings, chiefly hollow ware, to the amount of 150,000 tons. The enormous appliances for producing wrought-iron in masses, both for machinery and cannons, are truly marvellous. Many of the works are engaged upon armour and boiler-plates, no less than 30 forges being confined to this department, with an average annual yield of 70,000 tons.

In some of the outlying places the old German refining forge is still in operation. At Elbingerode, near the Hartz Mountains, there are several. The forge consists of a hearth, gradually sloping towards the lowest point, where the tuyere directs a constant blast from two pair of bellows, worked by a water-wheel. Two or three raw pigs are placed on the hearth, with their points directed towards the blast tuyere. The fuel employed is charcoal, and when a portion of the ends of the iron pigs is melted off, they are pushed further into the fire. Meantime, the workman stirs up the molten mass in the trough of the hearth with an iron rake, and when it has assumed a pasty consistency, indicating the proper point of decarbonisation, the heat is momentarily raised, to re-fuse and form into a ball, technically called a bloom. The bloom is then worked under a hammer of 8 or 9 cwts. The whole process occupies about five hours. To still further refine the iron, it is cut into parts, re-heated, and forged—a process known as *klumpfrishen*. To produce 2 cwts. of forged iron, 2 7-10 cwts. of pig-iron are needed, showing a loss of 26 per cent. The iron so obtained is of first-rate quality, and even answers to the test of being struck, and bent backwards and forwards over the edge of the anvil several times, without showing signs of fracture.

COAL MINING IN THE COUNTY OF DURHAM.

THE WEARMOUTH COLLIERY.

The Wearmouth pits are situated about one mile from the mouth of the River Wear, and near the north bank of that river. Messrs. William Stobart and Company are the proprietors. Mr. R. Heckels is the mining engineer, and Mr. Stephen Wilson engineer. There are two pits, 33 yards apart, each 12 ft. in diameter, and 291 fms. in depth from the surface to the Hutton seam. The strata sunk through consist of—

	Fms.	ft.	in.
1.—Alluvial clay and sand	19	3	0
2.—Marl and magnesian limestone	34	4	0
3.—Blue and grey metal	1	0	10
4.—Freestone sand	0	5	0
5.—Coal measures, in which are contained four seams of coal, varying from 2 ft. to 4 ft. in thickness, the Maudlin seam 6 ft., and the Hutton seam 4½ ft. in thickness; below this the strata have not been proved	234	5	2
Total	291	0	0

Originally only one pit was sunk, begun in 1826. No sinking of such magnitude had then been attempted in the coal field. The success of the undertaking is principally due to the enterprise of the three Brothers Pemberton, who bore the expense of it. Seven years were occupied with the sinking; the cost was 70,000*l.* This delay was caused by the difficulties met with in sinking through the alluvial sand, the limestone, and the sand beneath it, and from the heavy feeders of water which had to be pumped out, amounting to 3000 gallons per minute. The water at this part is now excluded by cast-iron tubbing; 55 fms. of it is inserted in each pit, rendering them almost dry throughout. A pumping-engine of 200-horse power was used during sinking operations (and afterwards) at the A pit, but this, as well as five bucket lifts of pumps in connection with it, have been some time removed, and water is now drawn at night-time by the winding-engines. The mine was thus worked originally by a single pit, divided by wood brattice into downcast and upcast shafts: this pit has been used for raising coal 37 years, and is now called the A, or upcast pit. The present winding-engine for it has one 65-in. vertical cylinder, 7 ft. stroke, direct-acting; steam pressure is 20 lbs., which is condensed. It has 13-inch double beat valves, cast-iron levers for parallel motion, which also work the air-pump and valves. The fly-wheel is 26 feet in diameter, half around which a foot-break acts. The rope-rolls are 23 feet in diameter at the first lap, and 26 feet at the last lap; these rest on walls built of ashlar stone, of great strength. Steel cages are used in the A pit. Each cage weighs 19¾ cwts., and carries six tubs in three decks; six tubs weigh 32 cwts. 2 qrs. 14 lbs.; the coal in them weighs 49 cwts. 2 qrs. 18 lbs., equal 102 cwts. when laden at the end of the rope. Each cage runs on four wire-rope guides, 3½ inches in circumference. The guides are suspended from framework, built in four hollow pillars of wrought-iron plates, about 80 ft. in height. A weight of 2½ tons is attached to the bottom of each guide.

To assist the engine in starting with the load two staples are sunk outside the engine-house, 18 fms. in depth. One counterbalance drum on the engine-shaft is 5 ft. in diameter, on which a large single-link chain winds; the weight of chain at the end of this is 5 tons. Another drum, on which a two and three link chain winds, is 3½ ft. in diameter, and has 7 tons of chain attached to it. These ascending and descending, and lighting on the bottom of the staples, serve to adjust the load and weight of rope somewhat equally on the engine. The head-gear, framing, and screens at the A pit are all constructed of wood. The platform stands 23½ ft. above the railway. There are six plain cylindrical boilers connected to this winding-engine; these are hand-fired. The chimney is 137 ft. in height.

The downcast, or B pit, now sunk to the Hutton seam, was originally, about the year 1846, sunk to the depth of 185 fathoms only. From the bottom of the pit a stone drift, 7 ft. square, was driven to the south-west, dipping 6 in. per yard, which intersected the Maudlin and Hutton seams, its total length being 1300 yards. There were then, by this arrangement, three engines at bank for bringing coal to the surface—one 58-in. cylinder beam-engine, 7-ft. stroke, direct-acting, 10-ft. drum, which hauled on the inclined stone-drift. This engine is now disused, and will be removed. The B pit was divided into three compartments by wood brattice; one of these was appropriated for the hauling ropes; in each of the other compartments two cages were worked, each cage carrying three tubs, in three decks. One winding-engine was a 57-in. lever engine, 7-ft. stroke, direct-acting, and has been removed. The other winding-engine has a 42-in. cylinder, is a beam-engine, 6-ft. stroke, and is also intended to be taken down. During three years engineering arrangements of an important character have been in progress, and only recently completed; two compartments of the pit are thrown into one, and the pit deepened, so that coal from the Maudlin and Hutton seams is now raised direct from the Hutton seam, at the B pit, by an improved winding-engine and two cages only. The new winding-engine has one 68-in. vertical cylinder, 7-ft. stroke, direct-acting, with 15-in. double-beat valves, wrought-iron levers, by one of which the air-pump, &c., is worked. The rope-rolls are 21 ft. 8 in. at first lap, and 25 feet in diameter at the last lap; these, with the main shaft, are supported by the side wall of the house on one side, and by wrought-iron girders and pillars on the other side. The engine is furnished with two foot-brakes, acting half around a large circle. Each wire-rope for this pit is in length 335 fms., composed of six strands, together 6 in. by ⅝ in. in section, and weighs 6¼ tons. The weight of rope from the bottom of the pit up to the pulley is 5 tons 12 cwts. The cages are made of steel, each carries eight tubs, in four decks, and weighs 35 cwts.; eight tubs weigh 43 cwts. 2 qrs., and will carry 66 cwts. 0 qrs. 24 lbs. of coal, making a total weight of 144 cwts. 2 qrs. 24 lbs. at the end of each rope. The conductors for these cages are all of oak, two to each cage.

There are two counterbalance drums on the main shaft, 3½ ft. in diameter, on each of which two and three linked chains wind; at the end of each 6 tons weight of chain is attached, which are worked up and down in a staple, 18 fms. in depth, to regulate the work of the engine. The pulley-frames at the B pit, including back stays and intermediate legs, are constructed of wrought-iron, by framing of four angle-irons united by lattice work. The frame is 78 ft. in height from the surface to the centre of the pullies; the pulleys are 16 ft. in diameter. A similar framework is erected at the back of the house for the counterbalance pullies. It is intended to adopt iron for the whole of the framing and screens at the top of this pit, and raise the height of the upper landing to 23½ ft. from the rails. As the first cost of iron is not much greater than with wood, the advantages in durability and safety with respect to fire will be great and manifest. Two landings are also intended both at the top and bottom of this pit, whereby only one lift with the engine will be required in working with four-deck cages. Ten boilers are placed near this engine, plain cylindrical; their length varies from 32 to 33 ft., and diameter from 7 ft. 4 in. to 7 ft. 6 in. The chimney is 130 feet in height. Each boiler has Juckes' firing apparatus applied to it; economy of fuel and labour result from their use, and the absence of smoke is an important consideration in the neighbourhood of a large town—and, in fact, in any situation. There are three vertical elevators, for screening the small coal made at all the main screens; the lift is 56 ft. in one, and 70 ft. in the other case; a pair of horizontal engines, of 16 and 18 in. cylinders, work two of these lifts, and is intended to be applied to the third also. In the staple above referred to one of Tangye's steam-pumps is placed 16 fms. down, which supplies water for the boilers and condensers. The steam-cylinder is 24 in., 12-in. stroke; steam-pipes from the surface, 6 in. diameter. It works a 10-in. plunger, double-acting. The water is forced up 10-in. mains to the surface. At the rate of 16 strokes per minute, it forces up 150,000 gallons in twelve hours.

UNDERGROUND WORKINGS.—On the north side of the pits the Maudlin seam is at present worked. The section near the pit is—

1.—Post, or sandstone.					
2.—Blue metal, mixed with post				5 ft.	0 in.
3.—Good coal	3 ft.	8 in.			
4.—Splint	0	4			
5.—Good coal	1	8	=	5	8
6.—Bottom coal, left in the mine				0	6
7.—Fire-clay, a hard floor.					

A little north of the pit a fault downthrow to north of 12 yards is found; this necessitated a stone drift dipping north to reach the Hutton seam again. This seam has been considerably worked in the district north of the fault; at present these workings are filled with water. By a rise stone drift through the same fault the Maudlin seam is reached. The haulage in the Maudlin seam is performed by an engine placed under the road, near the upcast, having two 22-in. horizontal cylinders, 4-ft. stroke, with two 6-ft. drums. This engine hauls each way by main and tail ropes, not only to the north, but also on the

east and west sides, the distance being about one mile to each extremity from the engine. The seam rises ½ in. per yard to the east, and about 1 inch per yard north of the pits. On the south side of the pits the rise is principally south, so that the deepest part of the basin is probably not far west of the pits, where the usual rise of the coal field to the west will commence. The Maudlin seam is worked on the bord and pillar system in two processes. The pillars are 30 yards square; the bords and walls are made 4 yards wide, but only 2 yards at each end for 5 yards in length; the cleavage runs nearly east and west. Powder is not used for the coal. Clanny lamps are used by the hewers. Most of the pillars are yet standing unworked, but a system of taking away the pillars shortly after the bords are driven is in contemplation. On the south-west side of the pits an engine-plane has lately been driven, perfectly straight for 1300 yards, nearly level, 11 by 7 ft. in area. It is driven immediately under the stone drift dipping 6 in. per yard, before referred to, and supersedes that arrangement: the latter now used only as an air intake. The engine for the south-west plane is placed 10 yards north of the B pit. It has two 14-in. horizontal cylinders, 2-ft. stroke, two drums 4½ ft. in diameter, speed reduced as 3 to 1. There are four boilers placed in the Maudlin seam to supply these engines with steam; each is 45 ft. by 5 ft., plain cylindrical; Juckes' grates are applied to each. The pressure of steam is 45 lbs. A 9-in. pipe conveys steam to the engines. At 600 yards from the pit a fault rising south 12 yards is crossed. About 1500 yards further another fault is crossed, down-throw to south 28 yards; these occasion a large amount of stone-drifting, and beyond the faults the Hutton seam is again met with, by preserving a dead level with the drifting. The Maudlin seam is worked in this district, and the Hutton seam in about equal proportions. The Maudlin coal is dropped down a staple to the Hutton seam, a depth of 40 yards. The engine-plane is laid with double roads. A set of 60 laden tubs are brought out while 60 empty ones are going in, moving at the rate of about 10 miles per hour. At the end of 1300 yards the plane branches into two, each of which is 400 yards, and requires a separate loose rope and return sheave.

The section of the Hutton seam, in the South Mothergate, 152 chains south-west from the pits, is—

1.—Post, or sandstone.		
2.—Black stone	4 ft.	0 in.
3.—Blue metal	2	0
4.—Clean coal	4 ft.	4 in.
5.—Bottom coal	0	2 = 4 6
6.—Hard fire-clay, strong floor, with ironstone in balls.		

The coal is extracted in this seam, by a single process, being got by driving in this case seven places southward, and 32 yards apart. These form the gate-roads through the goaf as the faces advance: 5 yards are driven southward in the solid, and 2 yards wide; a lift is then driven 15 yards to west, 5 yards wide, and after that is finished another lift to the east, the same width, is driven 15 yards. After this other 5 yards is driven southward in the solid, and the same process is repeated. The other 15 yards remaining is got from the adjoining gate-roads in the same manner. The gate-roads are kept a little in advance of each other successively. Pillars are formed in the gate-roads, 6 ft. wide on each side in the Mothergate, and 4 ft. in the other gate-roads: 18 in. of stone is taken down for this purpose; subsequently, 4 ft. more is taken down for horse height in the Mothergate. New cross-gates are formed east and west, every 50 yards. The principal cleavage runs north and south, but there is east and west cleavage also. No powder is used in working this coal, the great depth and pressure cause it to be got in a broken state; when holed, 2 ft. in it falls of itself. The temperature of the mine in these workings is found to be 83° in summer, and 82½° in winter. The natural temperature of the coal is found, by enclosing the instrument in the coal, to be 84½° to 85½°. The theoretical temperature due to the depth of 290 fms. would be 79°, calculating on an increase of 1° for every 60 ft. in depth. The production of gas in the working places of the Maudlin and Hutton seams is moderate in quantity.

In the workings of the A pit there are fourteen horses employed, and twenty-nine putting ponies. In those of the B pit there are fifty-one horses, and fifty-eight putting ponies. The engine planes are laid with 28 lbs. single head rails and chairs, gauge 2 ft. 5¼ in.; the wood tubs stand 3 ft. 11 in. above rail, 14 in. flanged wheels outside, each side of the box tapers upwards.

The ventilation of the mine is caused by a furnace, 12 ft. square, placed in the Maudlin seam, at which is consumed 119 cwts. of small coal in 24 hours; the furnace is fired at three points, the heat and smoke pass through a short staple close to the furnace before entering the upcast pit, which in a measure protects the pitwork. The ventilation is accelerated by the boiler fires, at which is consumed 8½ tons of coal in 24 hours. The amount of air in circulation in the mine is about 180,000 cubic feet per minute. The water pressure at the separation doors varies from 3 to 3½ in. The mines have been worked continuously for about 37 years; during this time very few accidents have occurred from explosions of gas, and not many from falls of the coal and roof, notwithstanding the great depth and extent of the workings.

The two winding-engines are capable of raising 2000 tons of coal per day, but 1760 tons is as much as has been raised. The A pit engine in two weeks raised 451,000 gallons of water=2064 tons. The B pit engine in the same time raised 18,480 gallons=84 tons; this is raised in tanks; the former is occupied about four hours each night with the water.

The coal is conveyed from the colliery to the shipping places on the Wear by two self-acting inclines, both of which are 300 yards in length, and run side by side. There are three drops and two spouts for the shipment of coal, 45 ft. in vertical height. An engine, with 13½-in. horizontal cylinder, 2-ft. stroke, on second motion, with 4-ft. drum, is used for hauling timber and other materials from the quay up to the pits.

An engine of 18-in. cylinder, 2 ft. 10-in. stroke, is used for driving circular saws of various sizes for cutting timber. Another engine, 12½-in. cylinder, 2-ft. stroke, drives a 30-in. fan, which supplies blast to 13 fires in the smiths' shop; it drives also two lathes, two drilling-machines in the fitting-shop, and a forge-hammer.

The coal produced from the two seams worked at Wearmouth Colliery is sold principally for household purposes; but, as it produces a large quantity of gas of high illuminating power, a considerable yearly sale is also found for the manufacture of gas, one of the London gas companies alone having been supplied with upwards of 100,000 tons per annum for the last 20 years.

IS COAL CONTRABAND OF WAR?

SIR,—The importance of a satisfactory solution of this question can scarcely be over-estimated at the present juncture. Two of the most powerful continental nations are now engaged in deadly strife, and two of the most gigantic armies the world ever produced are bent upon each other's destruction. It is the policy, as well as the interest, of all other nations to endeavour to circumscribe the limits of the awful carnage which, unquestionably, will result, and do all in their power to confine the war to the two belligerents who are pitted against each other. England has declared its neutrality, but it is every day becoming more and more evident that unless an emphatic answer be given to the question as to what constitutes this neutrality, and what goods are and are not contraband of war, a very great danger exists of giving serious offence to one or other of the combatants. France apparently depends as much upon her navy as her army, and has already sent a powerful fleet of steamers to the Baltic. Prussia says, and says very truly, that this fleet of steamboats cannot possibly exist there, for any practical use, even for a few weeks, without steam coals from England; and the Prussian Government is already growing impatient, and even irritant, at the indecision of the English Cabinet in expressing its opinion as to what is and what is not contraband of war.

The question whether coal is contraband of war has always been, more or less, one of doubt and difficulty. Legal authorities of the highest repute are pretty nearly equally divided upon the point. Some affirm, with great emphasis and confidence, that coal, which now forms so important an essential in naval warfare, is as much contraband of war as naval provisions or any other material; whilst other authorities affirm, with equal tenacity of opinion, that inasmuch as coal is an article largely used in time of peace as well as in time of war, it cannot be considered contraband, and to prohibit its export would be to unnecessarily interfere with the legitimate trade and commerce of the kingdom. We need scarcely remark that this question is one of vital importance to the colliery proprietors of the kingdom, especially to those North Country and South Wales owners, who have valuable seams of steam coal. The war will necessarily give a great impetus to their trade, and it would be a source of satisfaction if both the contending nations were to express their opinions upon the point at issue with clearness and promptitude. Our Government, with great prudence and caution, have declined to pronounce any decided opinion as to whether coal is or is not contraband of war. The point rests with the belligerents, and not with the nations who are neutrals. Coal declared contraband of war would offend France, who would then be deprived of the motive power of her fleet; its free exportation, on the other hand, offends Prussia, who has a supply of coal in her own territory, and who regards England as providing France with the means of naval warfare. In a case of such difficulty, therefore, should any vessel be seized with coal as contraband of war, the question will have to be settled by the legally constituted Prize Courts of Appeal, and will have to be governed by the various circumstances which surround the special case. In the meantime, our colliery proprietors and freighters will have to take the whole responsibility upon themselves, and will have to run the chance of capture by armed frigates or men of war. It would, however, be a matter of the greatest satisfaction to all parties concerned if some definite understanding could be come to, deciding, once for all, whether coal is or is not contraband of war. Until this question is definitely settled there will always be the risk of giving offence to one or other of the belligerents, and our colliery proprietors and merchants can scarcely be blamed until the queston be settled one way or the other in taking the fullest advantage of that increased trade which will necessary arise consequent upon the present disastrous and sanguinary continental war.

Mr. Gladstone stated in the House of Commons, on Monday night, that the exportation of coals direct to the fleets of either of the belligerent powers would be regarded as a breach of the Foreign Enlistment Act. In other words, the direct exportation of coal either to France or Prussia is considered illegal; but there are so many ways of avoiding the direct export of coal to the contending parties that the announcement of Mr. Gladstone threw but little light upon the subject, and our merchants and shippers will still have to take upon themselves the whole responsibilities of the exportation of coals.

N. S.

IS COAL CONTRABAND OF WAR?

SIR,—Mr. Wood objects to my assertion that "coal carried by English ships direct to the fleet or coaling station of either belligerent is contraband, and both the cargo and vessel are liable to confiscation." "This," says Mr. Wood, "is carrying the doctrine of the 'infectiousness' of contraband to an extent unauthorised by the general law of nations." He then goes on to cite certain cases, in which he admits the ship would be confiscated on account of a contraband cargo. But, he says, "in all other cases the cargo only is confiscated." Mr. Wood has fallen into the error of confounding the law with the practice. The fact is that England has taken upon herself to relax the strict rules applicable to these cases. But the practice of England is, in the absence of treaty stipulations, not binding on any other State. I will quote some *dicta* of that great international lawyer, Lord Stowell, on this subject. In his judgment, in the case of "The Atalanta" (6 Rob., 459), he speaks of "the very lenient practice of this country, which, in this matter, recedes very much from the correct principle of the law of nations, which authorises the penalty of confiscation." This is rightly stated by Bynckershok to depend on the fact whether the contraband is taken on board with the actual or presumed knowledge of the owner. I say presumed knowledge, because the knowledge of the master is in law the knowledge of the owner—*si scicerit ipse est in dolo et navis publicabitur:* and again in the case of "The Franklin," he says, "Anciently the carrying of contraband did, in ordinary cases, affect the ship, and although a relaxation has taken place, it is a relaxation the benefit of which can only be claimed by fair cases." Whether the case of a vessel laden with coal sailing from Newcastle direct to a belligerent fleet is a "fair case" or not, I leave it to more competent authorities to decide—in my humble opinion, it is not. Besides, I say that in such case the owner of the ship must actually or presumably know of the shipment and destination of the contraband, and, therefore, he cannot plead *bona fides*.

As to the second objection taken by Mr. Wood—to my statement that the "exportation of coal, if contraband, ought to be prohibited," I would remark that it is chiefly a question of expediency. If Parliament choose to insert a clause in the Neutrality Act, now before the House of Commons, prohibiting the furnishing of coal to belligerent war vessels, they have undoubtedly a perfect power to do so; whether it would be expedient or not is another question. Wheaton, I know, propounds the theory that a State cannot prohibit the exportation of contraband of war "without a manifest departure from the principle of neutrality." This is, I submit, an erroneous view. If it be true, then some of the clauses of our present Foreign Enlistment Act are departures from the principles of neutrality. I prefer the definition and doctrines of Prof. Blunschli, of Heidelberg ("Revue de Droit International," vol. ii., p. 469)—"Neutrality is not participation in war. When a neutral state aids one of the belligerents it takes part in the war in favour of such belligerent, and, therefore, ceases to be neutral. The other belligerent is justified in treating this participation as an act of hostility."

The question then is, if England sends English coal in English ships direct to the French fleet, is it an assistance to the French or not? If it is, then, in my opinion, it ought to be prohibited, as arming and equipping a vessel of war for either France or Prussia is prohibited by the Foreign Enlistment Act at present.

New-square, August 1. JOHN CUTLER.

COAL, AND THE WAR.

SIR,—The efforts made by certain members of the House of Commons to impede the export coal trade, and thus depress prices, appear most unjustifiable, and entirely in the interest of France and the South Wales colliery proprietors. To suppose that an English vessel would be permitted to carry coals, under the protection of the British flag, from an English port to a belligerent fleet at sea is absurd, for with the present system of naval warfare a coal-laden vessel forms as essential a portion of a fleet as a man-of-war; but colliery owners generally look rather to the profits derivable from the increased demand for industrial purposes both in France and Prussia, in consequence of the war interfering with the ordinary supply. This has been fully felt by Prussia; and the Government of that country, therefore, declines to declare coal contraband of war, although it naturally desires to prevent the coaling of the French fleet directly from English ports.

The reply of Mr. Gladstone in the House of Commons on Monday must be highly gratifying to the coal trade, and should stop all complaints from Prussia. He stated that the House had been apprised on more than one occasion that there was nothing at present to prevent the export of coal; and the question whether it was contraband of war would be one for the consideration of the Government of the captors. But, though the exportation of coal had not been prohibited, exporters had been warned that if it were supplied to either belligerent it would run the risk of capture. If colliers were chartered for the purpose of attending the fleet of a belligerent, and supplying it with coal to enable it to carry on its hostile operations, such colliers would, to all intents and purposes, become storeships attached to the fleet, and would be liable to the English law under the Foreign Enlistment Act. Finally, he undertook that immediate enquiries should be instituted by the Government into the existence of any such case. And, again, in replying to Mr. Disraeli, he expressed our unequivocal friendliness to both parties in this unhappy quarrel. England is not inclined to side with Prussia under any pretext; yet, according to Mr. Gladstone's statement, it may be concluded that an English company will not be permitted to lay a telegraphic cable from Dunkerque to a northern port, as this would very properly be considered as a breach of neutrality.

The coal trade, then, can be carried on precisely as heretofore. The Prussians have declared coal not to be contraband of war, and cannot, therefore, complain of coal being shipped to French ports not used by ships of war; and the French have assumed that coal is not contraband of war, so that no fear need be entertained o seizure by French vessels when shipments are made to Hamburg or other German ports. Now, it is precisely these latter shipments that the North Country coalowners are most interested in. French ports are so much more easily reached from South Wales than from Durham that French industry can, no doubt, be more cheaply supplied, during the war, with Welsh steam coal than with North Country; but, on the other hand, the Hamburg and North German trade should be entirely in the hands of the North; and, as many of the shipments to German ports would be made by German houses, they will, of course, be well informed as to the ports which it is most desirable to ship to, and the risk of making shipments would be no greater than in shipping any other class of merchandise. In time of war shipments of all kinds both to and from the countries of the belligerents are made with less security than in time of peace; but, considering the engagements of both parties in the present case, I do not think there is anything to interfere materially with our export coal trade so long as we avoid supplying the belligerent fleets or ports frequented by ships of war.—*Newcastle, Aug.* 3. COAL.

GOVERNMENT INSPECTION OF COAL MINES.

SIR,—The returns made by Inspectors during the last six years do not show any improvement in the saving of human life, but rather the reverse—the loss of life in 1864 being 1 for 395 persons employed, and 1 per 109,715 tons of coal raised. The loss of life in 1869 was 1 in 309 persons employed, and 1 for 96,777 tons of coal raised, the intermediate years being all in an increasing proportion. The average of coal raised for each male employed is 311 tons, from the year 1863 to and with 1869—or 309, 313, 314, 315, 301, and 312 tons in each respective year, so that the proportion between the number employed and the tons raised does not vary much.

The increase of quantity from 1864 to 1869 has been at the rate of 2,576,112 tons in each year. The increase in quantity from 1856 to 1865, or 9 years, was, according to returns, at the rate of 3,500,570 tons for each year; but it is probable those earlier returns do not give all the sources of supply, and do not make allowance for overweight in some cases, as we understand is now done, in order to make these returns as correct as possible. If this were so, the increase per year of output would not be so large as stated above, and the calculation of the yearly loss of life in proportion to coal raised would require correction. The loss of life in 1856—for instance—when inspection of coal mines first commenced, was 1012; the coal raised—as stated—was 66,645,450 tons, or 1 death for every 65,855 tons raised. The loss of life in 1869 was 1116, the coal raised 108,003,482, or 1 death for every 96,777 tons raised. This shows an improvement from 1856 to 1869, supposing the returns at the earlier periods to be correct. Unfortunately, there is a falling off in the proportion of deaths to tons raised in later years—from 1864 to 1869—which is much to be deplored. A remedy for this state of things must be had in providing careful and well-experienced managers to conduct our coal mines, and inspection of them at stated periods, to verify that they are properly conducted—so do we hope to avoid explosions, prevent as far as possible accidents from falls of roof and coal, and know from observation that the appliances for winding coal are in perfect order, as well as the shafts and inclined planes and roads, both underground and on the surface. To show the accidents to which each district is most liable, we subjoin a table of the proportion of each class of accidents, so that where the numbers are excessive, especial attention should be directed to reducing them in amount.

Table showing the precentage of Loss of Life in the Coal Mines of England, Wales, and Scotland in the year 1869:—

Districts.	No. of collieries.	Tons of coal raised per life lost.	No. employed per life lost.	Percentage of deaths from Explosions.	Falls of roof and coal.	In shafts.	Miscellaneous
1.—Northumberland, Cumberland, and North Durham..	183	145,750	400	7	35	18	40
2.—South Durham.. ..	163	197,924	478	3	39	8	50
3.—North and East Lancashire	237	92,368	345	4	51	16	29
4.—West Lancashire and North Wales	200	34,269	139	55	19	9	17
5.—Yorkshire	413	157,877	522	2	59	10	29
6.—Derby, Nottingham, Leicester, and Warwick ..	200	103,846	365	8	40	15	37
7.—No. Stafford, Cheshire, Shropshire	225	124,000	420	14	50	14	22
8.—Sth. Stafford and Worcester	550	100,076	274	6	65	21	8
9.—Monmouth, Gloucester, Somerset, and Devon	210	91,912	382	34	54	0	12
10.—South Wales	300	50,718	160	38	35	9	18
11.—East Scotland	270	146,552	483	2	52	14	32
12.—West Scotland	195	157,360	513	10	72	16	2
Total and average.	3206	94,777	309	23	42	11	24

This table shows, in the total average, that 42 per cent. of the deaths arise from falls of roof and coal, and also the proportion in each district of the four classes of accident which cause death. South Durham has 50 per cent. of its loss of life from miscellaneous causes, underground and on the surface—only 3 per cent. arising from explosion; West Lancashire and North Wales has 55 per cent. of its deaths caused by explosion; North and East Lancashire has 51 per cent. of the loss of life caused by falls of roof and coal; Yorkshire has 59 from the same cause; and East and West Scotland, 52 and 72 per cent. respectively. These high proportions denote that more stringent and careful measures are required in the method of working for the prevention of this great loss of life. C. V.

COAL-CUTTING MACHINERY.

SIR,—It will, I think, be acknowledged that if gunpowder is to be prohibited in mines mechanical appliances capable of enabling the men to get down the same quantity of coal in the same time must be introduced, and as far as I have seen nothing has yet been proposed that is at all likely to fulfil this condition. All the coal-cutting machines which have hitherto been proposed are far too cumbrous and expensive for general use. It seems to me that the so-called labour saving machines do not relieve the miners much, as there is really more labour in getting the machine in position than in cutting the coal by hand, and this, perhaps, more than anything else has tended to prevent the general adoption of the machines. What seems to me to be wanted is a machine to cost not more than 2*l.* or so, and to be supplied to every hewer. The hewer might be required to keep it in repair as compensation for any labour it might save him. If so, it must be simple, and not liable to damage except by carelessness, and ought not to weigh more than a hundredweight, so that one man and his assistant could lift it.

Then comes the question, what sort of machine is best? and I feel sure that none of those with cog-wheels, springs, and compressed air cylinders, will be of any use, owing to their liability to derangement; but I think all these complications could be dispensed with. Hand labour should be imitated as closely as possible, for what we want is a contrivance that will pick a good side groove quickly, leaving the kirving at the foot to be done by hand as at present. For the motive power, I am in favour of a falling weight, and I believe 56 lbs. will give all the force we want. My idea is to imitate the tilt hammer motion, and if that will not succeed nothing will. Let there be a standard formed of a hollow steel tube, about 4 in. diameter, with a claw-foot, and pointed screw top, to make it firm between the floor and roof. This standard should have in it two slots near the bottom, about a foot long, opposite each other, and the 56 lbs. weight should form a ring round the standard, a couple of pins passing twice through it, and through the slot. The weight would thus have about 8 in. play. The use of the weight is to bring down the pick, which I shall presently mention, to cut the coal. I thus get the means of keeping the concern in position, and the motive power; the machine is equally simple.

The standard should carry a cam-plate, turned by a handle, the pick being pivotted on the same centre, and the cams should be so arranged as to lift the pick six times at each revolution. A screw arrangement must be provided for keeping the pick up to the work, which should always be commenced near the floor. The undercut

having been made (say) to a depth of 36 inches, the machine is set to work, and groves the coal on one side. As the pick makes six strokes for each turn of the handle, it is unnecessary to make a deep cut, so that there will be no fear of the pick becoming fast, and no more small will be made than by hand labour. One of the wedging machines could then be inserted on the other side, and the coal removed.—*Aug.* 2. COLLIER.

BLASTING IN MINES.

SIR,—The rise in the price of gunpowder, coupled with a heavy fall in the value of the ore raised, renders it essential that miners should seek to diminish to the utmost the cost of production, or to find new uses for the minerals which the mines produce. A low price for ore is at all times to be deplored, yet some of the most important chemical and metallurgical processes have been the result of increased difficulties experienced by the miners to secure profits. Let us hope that the effect will be the same in the present case, and that miners will either learn to manufacture their materials for blasting powder on the spot, or find a substitute. The wholesale price of gunpowder has increased nearly ½d. per pound, and as this will cause a loss to every man underground of nearly 1d. per day, it may induce those interested in mines to endeavour to save some of the sulphur which now goes to waste in the process of calcining. At more than one chemical works in Westphalia mundic of much inferior quality to that thrown away in England is made to yield the finest flowers of sulphur, and although the other conditions are not more favourable than in Cornwall, the profits realised amount to many thousands of pounds annually. A little exertion in this direction would compensate tenfold for the extra 1d. per day paid for gunpowder.

But if Cornish miners do not possess the same ability as the Germans to turn their sulphur ores to account, could they not call in the aid of gun-cotton, or nitro-glycerine at least, as a temporary substitute? The strength of both these materials is greater than that of gunpowder, and there is, of course, the inconvenience of being compelled to use a somewhat larger quantity of them than is necessary for the work, yet in cases of emergency minor inconveniences must be overlooked where by overlooking them increased economy results. The facility with which nitro-glycerine can be prepared as wanted gives both it and dynamite, which is a non-explosive powder saturated with nitro-glycerine, some advantage over gun-cotton, the preparation of which takes a considerable time; and, no doubt, this dynamite could be generally introduced if a means could be discovered of saturating two distinct portions of the non-explosive powder with the two distinct constituents of the nitro-glycerine. These two powders could then be carried, as each would be absolutely non-explosive, with the greatest safety to any distance, and when required would merely have to be sifted together. Whether this could be done I do not know, because, perhaps, it is necessary to the success of the dynamite that the nitro-glycerine should be thoroughly prepared before it is added to the protective powder.

With regard to gun-cotton, there is one great circumstance in its favour, which is that it can be conveniently reduced to the strength of blasting powder. I believe this improvement was made by Messrs. Prentice, of Stowmarket, and it consists in simply diluting the gun-cotton with ordinary cotton. The mass is then compressed into suitable-sized cartridges, which are so impervious to moisture that they can be fired in a damp hole, and so solid that waste in using them is almost impossible; but we must not lose sight of the fact that whether gun-cotton, nitro-glycerine, or dynamite be compared with gunpowder, it is the cost per charge that should be considered, and if this be done it will be found that gunpowder is a very large percentage more economic than any other explosive. MINER.

Aug. 2.

BOILER EXPLOSIONS.

SIR,—Having seen a letter from the Boiler Makers' Association, defending themselves from all blame concerning boiler explosions [see Supplement to the *Mining Journal* of July 23], I know from experience that they are not to be trusted more than other artizans. It is a well-known fact that, as a body, they want well looking after to do good work. There are plenty of good men who are compelled to do inferior work against their will. Some of the masters will take work at any price—so much as 4*l.* per ton less than others—and put inferior iron in their work, with good men to make them. The boiler looks well to the eye, but that is all it is worth. There are plenty of small boilers made from old plates, second-hand ones repaired with the same, and whole bottoms even put in with the same. I think that when a boiler is condemned it should be cut up and sent to the scrap forge. I would suggest that the millowners, as a body, should join together and have their own inspectors, and not such a wealthy body of gentlemen be compelled to be under the jurisdiction of compulsory men or measures. They could pick out better men for inspectors who would do their duty. In the first place, wherever they went to inspect they would know they were working for their masters. On the other hand, under the company they might be very neglectful of their duty.

I will make a few suggestions that may be of some use. In the first place, I would have good men, boilers makers, to go under every boiler to sound them and examine them minutely, inside and outside, to see if they are properly cleaned, the stays and flues all right, and to give in their report to the heads of the firms. Let Manchester have inspectors, and give a full report to the committee that might be chosen from amongst themselves. I mean the steam users of Manchester. Let other districts do the same. Every boiler that is made should have a plate on the front when made, with the name of the maker, the date, and the pressure it ought to carry, according to the make that has been ordered by the parties that will use it. Strict enquiry should be made as to the amount of pressure they are calculated to carry, and let the boiler be made accordingly, and truly registered on the front plate, similarly to the cranes in the dock-yards—say, 10, 20, or 30 tons, according to strength. It would be well for those getting boilers to send their inspector and see that they get the iron that they bargain for. I would have a safety-valve, sealed and locked, to every boiler, to be under the sole control of the inspectors, and place a box on the boiler with perforated holes, so that it could not be tampered with. I would have low-water alarm whistles, to be kept as secure as the safety-valve, and good fusible plugs.

These suggestions acted on, there would be few explosions. I have had much experience both in boiler making and working them. I think the time has come when there should be something done in the matter. Boilers used to carry 3½ lbs. to the square inch, and were considered very high at 8 lbs. or 9 lbs. to the square inch. Now they are working 60 lbs., 70 lbs., and 80 lbs. to the square inch. I think it is high time that this high rate should receive a check. J. W.

THE BARTLETT LEAD.

SIR,—Owing to the publication of a careless description in another London newspaper, you stated (and not without reason had the data been correct) that the Bartlett lead was an impossible compound, produced by an impossible process; yet you will at once see from the details subjoined that there is nothing unscientific in the process, and that the product is really an article of very considerable commercial value, and destined to replace both white lead and oxide of zinc as a pigment. It will also be apparent, I think, that at least at present the natural ore from which the Bartlett lead is produced is superior to what any artificial compound of lead and zinc would be.

The power of oxide of zinc to resist atmospheric influences has long been known to be superior to that of white lead, but it has also been equally well known to have less body, and it is now found that the combination has the advantages of both, without the objections of either. The Bartlett lead is made from a peculiar argentiferous galena, containing zinc, found in North Carolina, the ore being roasted in a specially formed furnace to desulphurise it and oxidise it, and the resulting pigment may be described as an oxide of zinc, containing upwards of 40 per cent. of lead. It has been a matter of dispute here as to the form in which this lead is contained, but this is probably owing to the pigment never having been analysed, and not in consequence of the inability of our analytical chemists, for I do not mean to assume that a reliable analysis cannot be obtained at our School of Mines. One theory put forward, though I do not know upon what chemical authority, is that the roasted ore as received from the mine contains a certain percentage of basic sulphates; these are set free by the fire heat. The lead is also oxidised, and goes over as a peroxide, the zinc in its usual form. The sulphur of the sulphates is set free as sulphurous acid; this unites with peroxide of lead, and forms a new character of sulphate, not being enough sulphurous acid to take up all the lead, the remainder, assuming its acid character, unites with the zinc as a plumbate of the oxide. It is claimed for it that it has more body and greater durability than white lead, and will not peel off as does zinc oxide. Its peculiarities are that when mixed with oil or spirits of turpentine it does not settle as other paint; that a building painted with it bleaches whiter instead of turning yellow; that when mixed and exposed to the air it thickens, and it has a peculiar gloss, unknown in any other pigment. At least, some of these peculiarities may be due to the fact that a large part of its oxygen is in the form of ozone.

You will thus admit that the Bartlett lead is not altogether an impossibility, but the most extraordinary part of the matter is that even the manufacturers appear to be in the most profound ignorance as to its nature, since they state that "the Bartlett lead is an inseparable mixture of some form of lead and the anhydrous oxide of zinc. It contains from 30 to 40 per cent. of the former, is finer than any pigment known, and has peculiar properties possessed by no other pigment. It has now been before the public for about two years, and, baring the disadvantages incident to any new article, has met with almost universal favour, and is increasing in popularity. It is a singular product, and emphatically a new discovery in science and the manufactures." Have the enterprising proprietors looked for any salt of baryta as a constituent of their invaluable pigment?

New York, July 10. ANALYST.

THE METALS AND THEIR ORES—No. X.

SIR,—In Article No. II., in the Journal of May 21, I described the process by which the specific gravity or density of a solid substance could be taken when in a compact form. In the present paper it is my intention to explain—firstly, the method of ascertaining the specific gravity of solids when in broken or crushed fragments; and, secondly, to show how the knowledge thus obtained may be applied to a useful and practical purpose by the miner or ore-washer, by enabling him to judge, with almost absolute certainty and exactitude, whether or not the various parcels of ore he may be preparing for market are cleansed from their associated matrix and gangue, and brought to their requisite standard of purity, and also of distinguishing betwixt the relative qualities of different parcels of ore.

The apparatus required are a good balance, and a set of grain weights; a glass bottle, of about an ounce capacity, and a well-ground stopper; and a jug containing water at a temperature of about 60° Fahr.—the other requirements being the bestowal of a due amount of care and attention. The process is conducted as follows:—

1.—A fair and dry sample of the ore to be tried having been taken, a small quantity (say, 200 or 300 grs.) is carefully weighed out of it.

2.—The glass bottle having been perfectly filled with water, the stopper replaced, and all adhering mixture wiped off, is also carefully weighed, and its weight added to that of the ore.

3.—A portion of the water having been emptied from the bottle, the ore is poured, without waste, into it, and, after having been well shaken to drive off the air-bubbles contained in the ore, the bottle is again filled with water, the stopper replaced, and the whole re-weighed together.

4.—The weight of the bottle of water and ore in it is subtracted from the combined weights of the ore (No. 1), and bottle of water (No. 2), the difference showing the bulk of water displaced by the ore.

Lastly.—If the weight of ore is divided by the difference or loss, the quotient will represent the specific gravity of the sample tried.

For example,—

A sample of dressed Cardiganshire silver-lead ore (galena) weighs....Grs.	200·0
The bottle full of water weighs	644·4
Combined weight of bottle of water and ore	844·4
Weight of bottle of water containing also the 200 grs. of ore	816·7
Difference, or loss	27·7

Then, 200 ÷ 27·7 = 7·22, the specific gravity of the ore tried.

I have appended to this paper a list of the most frequently occuring ores, and the specific gravity of each description when naturally and chemically pure. By referring to this table, it will be found that the density or specific gravity of pure galena (sulphide of lead) is 7·5, therefore as we have in our sample only succeeded in obtaining a density of 7·22, we not only know that the ore is not perfectly clean, but we also know approximately, and by a simple and expeditious process, to what extent the sample stops short of the highest degree of purity attainable by washing processes. So practically servicable is the method, that in the supervision of the mines under my control I am constantly in the habit of using it as a ready means of distinguishing between the well and badly dressed samples, and the relative qualities of the various ores prepared for sale. As the density of a pure ore or mineral remains constant under all circumstances, it follows that when the specific gravity of a body is known the miner can, if he has any doubt as to the identity of any particular ore, form a pretty correct conclusion as to what a substance is, or is not, by means of its specific gravity alone. For instance, supposing it to be difficult to distinguish by the eye betwixt the small crystals of tin and those of blende, an appeal to the specific gravity of each would alone be sufficient to settle the question, the density of tin ore being 6·5, whilst zinc-blende is only 4·0 times that of water.

The following table gives the specific gravities of some of the most important of metallic ores:—

Name of substance.	Spec. grav.
Antimony—Native	6·6
Oxide	5·56
Sulphide	4·6
Arsenical	6·2
Antimonial—Nickel	7·5
Arsenic—Native	5·7
Yellow sulphide	3·48
Red ditto	3·5
Arsenical—Pyrites	7·0
Iron (mispickel)	6·0
Barytes—Carbonate	4·29
Sulphate	4·3-4·6
Bismuth—Native	9·7
Blende	5·9
Carbonate	6·9
Sulphide	6·4
Cadmium—Sulphide	4·8
Cobalt—Arsenical	6·4
Black oxide	2·2
Bloom	3·0
Pyrites	6·3
Cobaltine	6·1
Copper—Native	8·5
Blue carbonate	3·5-3·8
Green carbonate	3·7
Chloride	4·4
Grey	4·7
Phosphate	4·2
Pyrites	4·1
Red oxide	5·9
Silicate	2·0-2·3
Vitreous sulphide	5·5
Gold—Native	14·-19·
Iron—Brown ore	3·9
Carbonate	3·0-3·8
Chrome	4·3
Magnetic	5·0
Pyrites	4·8-5·1
Red hematite	4·8-5·3
Lime—Carbonate	2·5-2·8

Name of substance.	Spec. grav.
Lime—Tungstate	6·0
Lead—Native	11·3
Arseniate	7·18
Carbonate	6·46
Chromate	6·0
Molybdate	6·3-6·9
Oxide (minimum)	4·6
Phosphate	6·9
Sulphide (galena)	7·5-7·7
Sulphate	6·3
Tungstate	7·9
Manganese (wad)	2·5-3·7
Oxide	4·8
Spar	3·4-3·7
Mercury—Native	13·6
Chloride	6·4
Sulphide (cinnabar)	8·0
Molydbenum—Sulphide	4·5
Nickel—White arsenical	6·4-6·7
Glance	6·1
Pyrites	5·2
Palladium—Native	10·-12·
Platinum—Native	17·-19·
Silver—Native	10·-11·
Antimonial	9·4-9·8
Chloride (horn)	5·55
Glance (sulphide)	7·19
Ruby	5·7-5·9
Telluric	8·3-8·8
Strontia—Carbonate	3·6
Sulphate	3·9
Tellurium—Native	6·1
Tin—Oxide	6·5-7·1
Pyrites (sulphide)	4·3
Titanum—Oxide	4·2
Wolfram—Tungstate iron	7·0
Zinc—Blende (sulphide)	4·0
Carbonate (calamine)	4·3
Oxide	5·4
Silicate	3·4

In my next letter it is my intention to point out other useful and interesting facts upon the subject of "The Metals and their Ores."

Mining Offices, Shrewsbury, Aug. 2. EDWD. GLEDHILL.

VALUABLE DISCOVERY IN CARDIGANSHIRE.

SIR,—One of those great discoveries which only occur at intervals has been made at the Llwyn Teify Mines, by the cutting of a good course of lead ore, under the old works, which was wrought 130 years ago, for a length of 120 fms., and as deep as the old men could possibly go with their then appliances. All the old ore ground has been drained by a level driven in more than 700 fathoms to unwater it—50 fms. deeper than the deepest of the old works. The lode, so far as it has yet been cut through, is worth 20*l.* per fathom, and the ore ground thus laid open may be calculated fairly at 120 by 50 fms., equal to 6000 fms., at 20*l.* per fathom, or 120,000*l.*

Here is another instance of the great success to be met with in driving deep adits into the Cardiganshire hills, which, in this instance, will establish the Llwyn Teify Mines as the most important amongst the dividend mines in the county.

I have just come up from seeing the discovery, and write no more than anyone may see for themselves at any time. Three months more will suffice for the erection of machinery and all other matters necessary for making large returns and profits.

Goginan, Aug. 3. ABSALOM FRANCIS.

BRITISH AND FOREIGN INVESTORS.

SIR,—Permit me to draw your attention, and through you the large class of investors who use your columns and read them, to the effect which the present crisis ought to have upon the character of investments. The war on the Continent excites more apprehension at home and abroad than it did even a few days ago. A blow has been struck, not of first-rate importance, but still it was a battle; and, notwithstanding previous skirmishes, will be regarded as the drawing of first blood; and, as the wild beasts of the forest are maddened by the taste of blood to more furious efforts, so is it unhappily with man when, free from the restraints of religion and morality, he comes into contest with his fellows. It is now feared that the conflagration will extend; and, as a prairie fire rages onward with the breeze, spread as political designs and popular passions may waft it, until utter ruin and desolation are spread over a wide area.

It is now perfectly clear that France covets the whole territory occupied by the French-speaking populations of the countries contiguous to her. At all events, the Emperor is ambitious to rule over them, and France is acquiescent in the ambition, and as unscrupulous as her ruler in the means by which the end may be obtained. These facts are now so obvious that the British Government and Legislature are awaking to the reality, and placing the country in what is really a state of "armed neutrality."

Under such circumstances, is it not seasonable for investors to consider whether the rage for foreign Government securities, which has so long prevailed, is justified by reason and prudence? If foreign Governments, or the companies and adventures having foreign Government guarantees, have frequently found it difficult to pay interest on loans in times of general peace, what are we to expect when a continental war of the first magnitude is surging over the confines of great empires, as a swollen sea sweeping over an exposed shore? There can be little doubt that men will see the necessity of seeking other than continental investments in the present posture of affairs. French Rentes will be supported by French peasant proprietors; and the new Prussian Loan, of 15,000,000*l.* sterling, will be supported by Germany, and men of German race in every land; but British investors, unless mad with the infatuation for foreign investments which has prevailed, will "fight shy" of both. The old aphorism is not yet worn out—"Quem Deus vult perdere, prius dementat." The dabblers in foreign bankrupt Government schemes seem, according to the quotation, to be first demented and then doomed. The present prices of foreign securities of all kinds are much higher, in comparison with British stocks, than they should be.

The recent panic on the Stock Exchange, so far as regards British Government, railway, bank, mining, and general securities, was unreasoning and unreasonable; but it was sufficiently justified, so far as foreign stocks were estimated. And if so, what are we to expect when, if the war spread, the legions of the Kasir, not yet a feeble potentate, and those of the Czar, the most powerful of continental monarchs, are hurled upon central and western continental Europe?

British Government stocks do not pay high interest, but are magnificent securities. Our interference in the present struggle will not take place unless France enters Belgium. Napoleon the First said, "The French at Antwerp would be as it were holding a pistol to the heart of England." If we do interfere, our men and our weapons are the finest in the world. Our Schneider rifle is better than the Prussian needle-gun in a larger proportion than that is superior to the French chassepot; and when our troops are armed with the Henry rifle, they will be even yet more formidable.

Our railways now afford a fair form of home investment. India guaranteed is excellent. Our colonial credits are first rate. Our banks, &c., have acquired confidence and reputation. Our mines are at last, after prejudice had worn itself down, acknowledged to be indubitably good investments.

Some of the greatest fortunes ever made by investors have been in British mines, especially in Cornwall and Devon. There is the Providence Mine, in Lelant, an excellent example. If we cannot say, *ex uno disce omnes*, we may assuredly quote it as an instance among many. That mine has paid 50 per cent. upon the capital, a statement which holds good of many mines in Cornwall. Rose and Chiverton is a magnificent opportunity for all persons seeking *bona fide* investment in progressive mines.

I dare not further trespass upon your space at present, but when opportunity affords, or some new incident creates a fair occasion, I will forward a long list of mines, which afford an English investor ample security and generous profits. JOHN B. REYNOLDS.

Ethelburga House, Bishopsgate-street Within.

A GLANCE AT COLORADO—No. I.

SIR,—As this part of the United States is about to attract considerable attention, both here and in Europe, on account of the rapid development of its mineral resources, and as railways are in course of construction from the mining regions in the mountains to the trunk line that traverses the territory, whereby the minerals may be made profitable, a few lines from an old correspondent may be acceptable. Very little is really practically known as yet to the outside world of the facts in relation to the value of the mines: a good deal may be said *pro. et con.* on the matter, but I shall endeavour to elucidate the truth in all cases that may come under my examination, and report them for the benefit of those whom it may concern, Having no personal interest, present or prospective, in any of the mines, I have only the cause of science to subserve, and am, consequently, quite independent of either favour or affection.

Your readers have probably heard of the great coal discoveries at the foot of the mountains: they have, as a matter of course, as everything else is here, been greatly overestimated in quantity and value, but they are of sufficient importance to merit the investment of a large capital in their prosecution, which will be seen from the following extracts taken from my recent report on the South Boulder Colliery.

The geological formation is Tertiary, and the position of the coal seams now being worked Miocene. In about 100 feet, more or less, in depth the Eocene will be found, and this reposes conformably on the Cretaceous, which curves up to the first rocky ledges of the mountains, and which at this place are very abrupt. The mountains are composed of fine-grained dark-red sandstones, grits, claystone, breccia, and conglomerates, and, as far as I have yet been able to ascertain, of Triassic age. The Permian is not plain, if it exists at all. This group of strata is of considerable thickness, very indurated, and partially metamorphic. All the rocks are of a red colour. I have as yet found no metallic minerals, other than iron, of any commercial value in them. We next look for the Carboniferous system, but thus far I have looked in vain—not a vestige of any organic substance. Flora or fauna has not met my eye; this formation is missing. Heavy beds of transition rocks follow, until the primitive is arrived at, which is about 8 or 10 miles from the foot of the mountains. The transition rocks I believe to be partly Devonian, but no fossiliferous indication has been found to prove the remainder Silurian or Cambrian—nothing is positive in the geological scale here but the "zero point."

GRANITE.—In a future letter I shall describe the entire system minutely: it is unnecessary in the present instance.

THE COAL MEASURES.—These proved above water level are 476 feet thick, consisting of soft ferruginous sandstones, clays, argillacious sandstone, calcareous claystones, but no shales or plates. There are several beds of hematite and bog ores, but the bulk of them may be classed as hydrates; they are of the richest quality, make the very finest dark-grey pig-iron—in fact, some of the very best brands in the United States. These ores are abundant. I have made an examination of five seams of coal, respectively 13 ft., 4 ft., 5 ft., 7 ft., and 10 ft. thick, making collectively 39 ft. of solid coal: altitude above water level 34 ft., 60 ft., 214 ft., 243 ft., 278 ft., thus presenting every facility for easy working. Their inclination, where not influenced by faults, varies from 5° to 8° easterly. All have good strong roofs and clay floors. The coal is a lignite, of the most superior

quality, black, shining, and clean, almost free from sulphur, with no slate or carbonate of lime in the joints, and very little iron —in fact, a mere trace. There are grains and lumps of pure crystallised rosin disseminated throughout the lower seam, and stumps of immense fossil trees in the roof are frequently met with: they are not indigenous, for their abraded surfaces bear all the evidences of the drift. The cleat of the coal is uniform, its trend is nearly east and west magnetic: the variation of the compass is 15° 30′ east at this place. Was it not for the empyreumatic odour given off during combustion this coal would not be known as a lignite. Its high state of carbonisation and glistening surface makes it appear like the finest dry bituminous; but it contains very little bitumen, and for this deficiency it will not coke. It burns rather too freely, absorbs oxygen rapidly, which causes it to disintegrate; it burns with a pale yellow red-tinged flame, giving out a most intense heat, has an excess of hydrogen in its gases, forms no clinker or cinder, and the ash is a light, whitish-brown soft powder: specific gravity 1·200, therefore it weighs 75 lbs. per cubic foot, which is 1454 tons per foot per acre, giving for the united contents of the five seams 54,706 tons per acre. Assays by several experts have been made: they differ but little, only in the proportion of carbon and ash. I will only quote my own analysis, for in so doing I am responsible; it is—Water, 9·50; volatile matter, 39·65; carbon, 42·70; ash, 8·15=100·00. There was no trace of sulphur.

All these tertiary measures are subject to faults, upheavals, and downthrows, in the proximity of which the seams are contorted and disturbed, twisting them round, and pitching them at angles from 45° to vertical. The South Boulder Colliery, which comprises 1440 acres, has one of these faults passing through its eastern limits, but I compute that there is 30,000,000 tons of coal free from this disturbing element.

A scheme is on foot, of which probably you will soon hear more, for making this place the great smelting emporium of Colorado. Should the promoters succeed in their project, it will be one of the most lucrative speculations yet introduced into the territory. A sale of 200 tons per day is already guaranteed from the three existing lines of railway and domestic use in Denver, the capital of the territory, and adjacent towns. This is exclusive of what may be consumed by the smelting establishments, when erected; and as the coal yields a net profit of $1·70 per ton on the price it is hereafter to be set at, delivered in Denver, which is $4, the company will start under the most favourable auspices. CHARLES S. RICHARDSON.

Colorado, July 12.

[For remainder of Original Correspondence see to-day's Journal.]

ON THE MODE OF WORKING COAL, AND THE MECHANICAL APPLIANCES IN THE MIDLAND COAL FIELD.

BY MR. GEORGE FOWLER, OF NOTTINGHAM.

In coal working the initial problem was the mode of dealing with the load of the different strata which overlie the seams, and which impose a statical pressure upon the unwrought seam in the ratio of its depth from the surface. There were two principles upon which the question could be dealt with. In the early days of coal mining there did not appear to have been any intercourse between different mining districts, and it was somewhat remarkable that, whilst in some places the leading idea in the most ancient workings appeared to have been to work the coal in galleries, and to support them by leaving pillars on either side of them; in others the idea was to remove the coal entirely, and to secure the necessary openings of working places along the edge of the solid seam by taking advantage of the resistance which the overlying rocks oppose to vertical fracture, or shearing. In some localities, therefore, methods of pillar work appear to have been indigenous; in others the practice has always been to remove the whole of the coal at one operation, or, as it was commonly called, to work it "long wall." That was the method of coal mining as practised in the Midland coal field. By the method of pillar work portions would be removed, and the incident weight would be thrown on the pillars left. By a method of "long wall" the object in view would be to encourage the subsidence of the strata over the whole wrought area, and so minimise the incidence of pressure upon the solid seam. To that end the area of extension was large, and had straight boundary lines to facilitate the formation of lines of fracture in the superincumbent mass. Taking a long wall face—say, of 500 yards in length—it would be found that as the coal was removed the superincumbent weight was thrown upon the seam in advance, until it was sufficient either to bend down or fracture the rocks, so that they rested on the floor of the wrought mine. It would, therefore, be seen that the longer and straighter were the advancing faces the more promptly would there be a subsidence of the strata, and consequently relief of the pressure on the unwrought coal seam. If the term "statical pressure" might with propriety be applied to an unwrought seam, the term "dynamical" was equally appropriate to the additional pressure brought on by the act of working, and the principal point in long wall mining was to reduce that to a minimum. In the actual working of a long wall mine the first operation was to drive headways in the solid coals. When that had been done a sufficient length of working faces or stalls were started from the side, and the coal was removed in a series of slices parallel to the headway course. To support the roof of the working places timber was set, and pack walls of loose stone were built up at regular intervals. As the faces advanced the timber was withdrawn, and the roof settled down often without fracture upon the packs. The roadways for the conveyance of the coal were carried at intervals of 20, 30, or 40 yards between pairs of pack walls, and as the roof settled down and squeezed everything tight the requisite height for the roadway was maintained by ripping or cutting up into the roof. The roadways, therefore, of a long wall coal mine were carried through the goaf or area where the coal had been wrought—practically in the rock or other roof of the coal seam.

The application of power for the underground haulage of coal presented many interesting points for the consideration of engineers. No successful experiment as yet has been made in direct traction by a locomotive, as the heat and smoke would not only vitiate the ventilation, but also introduce the risk of fire, and in most cases soften and break down the roof of the roadways. It seemed improbable that direct steam traction would ever be used, except in a case where there was an arched roadway moderately level, and which could be provided with distinct ventilation.

The method of hauling by main tail-ropes was a modification of the underground haulage of a loaded train up an incline by a single rope. The wagons were attached to the ropes by means of clip-tongs, which gripped the rope, and so drew the train.

Another method was by the endless-chain. The wagons were run, not in long trains, but singly, spaced one by one along the roadway, and carrying the chain, which rests upon them, instead of running upon rollers. It would be seen that a method of hauling trains of wagons obtained its most favourable circumstances when a roadway was level and straight, as the work to be done in both directions was to overcome the friction and bending resistances of the ropes on the rollers and turn-wheels. With regard to the endless-chain, the practical mode of working was for the chain to lie on the top of the wagons, resting on their ends, on one of which there was a fork, into which the chain dropped loosely, for connecting the wagons. In the collieries in the district in which they were it was the practice to send out large blocks of coal, which rise considerably above the top of the wagon, and the loading was facilitated by leaving the end of the wagon open.

The application of steam-power to the raising of coal was not favourable to the realisation of a high percentage of useful results of the gross power expended. Although it was possible to balance accurately the weight of the cages, tubs, and ropes used in winding, the large amount of power expended in bringing a great weight of machinery from a state of rest into rapid motion, every time a load was drawn to the top, was unavoidably lost. After noticing the work done by several descriptions of engines, Mr. Fowler proceeded to say that direct economy of fuel consumption was not in itself a point of much importance at the fountain head of fuel supply; it was rather a question of boiler room, and boiler wear and tear; but it was a matter of much importance that machinery should be so constructed that they could develope a maximum of useful effect, and that they could do that with the least amount of strain to the working parts.

The next important point was the effect exercised by the weight of the machinery put in rapid motion, and stopped at such frequent intervals of time. It would be apparent that the conical drum brought with it the disadvantage of a great increase in the weight of the moving parts. Much, of course, might be done by so designing the machinery that a maximum of strength could be obtained with a minimum of weight, but the improvement must extend further in the direction of reducing the load on the engine at the commencement of the run, and expending the momentum usefully at the termination in raising the load. The point to be arrived at was to so modify the contour line of the drums that in the first two or three strokes of the engine its whole power could be expended in bringing the machinery into motion; that in the middle strokes it would lift the load, overcome the friction, and that in the last two or three strokes the leverage of the load was so much increased that the momentum was expended usefully in assisting the engine to complete the lift. That end could be obtained in a drum in which the contour lines received certain modifications, by which the weight of the empty cage acting on a large radius would be in excess of the full cage and rope acting on the small radius, and the surplus overbalanced load would assist the engine in getting up the momentum of the moving parts, whilst at the termination of the run, the circumstances being exactly reversed, there would be an equal amount of under-balanced load to absorb usefully the momentum of the running parts. By that means not only would the engine be made to do useful work during the whole series of revolutions, and be capable of raising a larger net load, but the severe strain unavoidable in reversing the steam whilst in motion, or the total annihilation of power consequent upon using the brake, would be avoided. It would also be apparent that the engine would sooner attain its full speed, and would be more quickly brought to a stand, so that the duration of each journey would be diminished. In raising a large tonnage of coal from a considerable depth, it was found desirable to bring out a maximum of coal for each journey, and to minimise the time occupied in loading and unloading the cage. It was desirable for the purpose of ventilation to reduce the area of the cages to prevent them from retarding the air current in the shafts, and for that purpose each platform of the cage held only one tub (as shown by diagram) of coal, and was less in area to one-fifth of the shaft. There were, however, four of these platforms or decks, and to save the time occupied in moving the cage there were two points of loading and discharging, so that all the decks could be loaded and emptied with one change in the position of the cages. The time so occupied was not more than 20 seconds, and the engines could raise 180 wagons of coal per hour.

COAL FOR THE NAVY.

In the House of Commons on July 29, on the question that the House resolve into Committee of Supply,

Mr. FOTHERGILL rose to call attention to the quality of steam coal in use by Her Majesty's steam fleet. He thought that in the present aspect of affairs it would not now be the proper time to make hazardous experiments with respect to the motive power of the steam vessels of the navy. The country possessed the finest quality of steam coal, and any experiments with a view to effect economy or improvement by the mixture of Welsh and North Country coal ought to be postponed to a more favourable opportunity. It was a fascinating idea that great economy might be obtained by the mixture of the two coals, but he had devoted his energies for 17 years to mixing these coals—not with the same object as the Admiralty had in view, but for the purpose of making coke. It was scarcely possible, on a large scale, to mix different kinds of coal successfully. If the mixture were left to stokers or engineers, it could not be effectual. The result would be that a column of smoke would pour from the funnel of a steamer which would be visible for hours, and in time of war would not be without its value to a vigilant enemy. When it was remembered that we had steam coal, mixed by nature, of a perfect character—the very best to be found in the world—and in unlimited quantity, he ventured to think the Admiralty should postpone their experiments, and be content to use this coal of surpassing quality.

Mr. E. SMITH, being connected with the North Country coal districts, denied the superiority of Welsh coal. The result of the experiments conducted under the directions of the Government could not be contradicted. He quoted the report of Capt. Rice of the trials in Her Majesty's ship Lucifer as decisive. North Country coal kept steam much better than Welsh coal. Welsh coal exposed to a hot sun in a great measure turned to dust, which was perfectly useless, but that dust mixed with North Country coal made a most excellent fuel. With North Country coal steam could be got up more quickly than with Welsh coal, and nothing was of more consequence than this to a vessel desirous of pursuing or avoiding an enemy.

Mr. HUSSEY VIVIAN said the hon. member had read the results of the experiments, but not the governing clause. The savings which he attributed to the mixture of coal were due simply to the use of a particular kind of furnace. There was a positive saving of from 12 to 14 per cent. upon Welsh over North Country coal. A return which was obtained upon his motion last year of the coals burnt in Her Majesty's navy during the six months ending June, 1869, showed that out of 700 reports received from ships in all parts of the world there was but one report in which complaint was made of the Welsh coal. The hon. member appeared to think that mixing coal out of different bunks was a very easy matter. The stokers, however, were the very lowest class of persons employed on board a ship of war, and could not be expected to exercise any very nice discrimination (hear, hear) as to the quantities in which coal ought to be mixed. Moreover, in hot climates, the mere manual labour would give them quite enough to do without thinking of mixing the coals at all. He himself had considerable experience in this matter, and attempts to mix coal had given rise to some of the greatest difficulties which he ever had to contend with. The hon. member referred to the experiments which had been made at different times from 1848 to 1868 as to the relative values of Welsh and North Country coal; and said that, up to the time at which the present Board of Admiralty came into office, the results of these experiments had led to the use exclusively of the Welsh coal. He wished to know on what the present Board of Admiralty based the change which marked its advent to power, because, unless the Board had in its possession some evidence with which he was unacquainted, he thought it conclusively proved that no such change was called for. The experiments made on board the ships Urgent and Lucifer—which, by the way, were experiments not so much upon coal as upon furnaces (hear, hear)—clearly showed that the result of using Welsh coal alone was a freedom from smoke during three-fourths of the time over which the experiments extended, while the mixed fuel produced during two-thirds of the time a smoke so dense as to prevent the signals being seen. (Hear, hear.) It had not been shown, he would remark further, that the use of North Country coal decreased the consumption, but, on the other hand, the report stated that the amount of North Country coal burnt per hour was one-eighth in excess of the consumption of Welsh coal. The saving in the use of Welsh coal over mixed coal was 17·5 per cent., and the gain in revolution was 6 per cent., so that in effect the loss occasioned by the use of mixed coal amounted to 17½ per cent. Then, again, Admiral Cooper Key said the annual expenditure would be increased by the use of North Country coal in large proportions, while it occupied about 4 or 5 per cent. more space than that taken up by Welsh coal. "I think, however," said the Admiral, "that the proportions now adopted in the service will be found very suitable." [Mr. EUSTACE SMITH.—"Hear, hear."] The hon. member might say "hear, hear," but how could he show the last statement of Admiral Key to be consistent with his former ones? Certainly the amount of smoke produced by the mixed coal had been diminished by the use of intricate and finely contrived devices applied to the furnaces, but these, he thought, would not stand the wear, tear, and hurry of actual service. After all, he would ask why they should struggle against Nature. Nature had provided the country with the very best fuel in the world, and the Government was seeking, for some occult reason which passed his understanding, to violate the laws of Nature, and to use a fuel which was without doubt of a most inferior character. (Hear, hear.) He had got a return of some 700 trials, and the commanders of Her Majesty's ships invariably reported in favour of Welsh coal. It was not the consumption by the Admiralty that their constituents regarded, but it was the stamp put upon the coal which Her Majesty's navy used. If there was a trial at all let it be a practical one. Let two ships be supplied—the one with Welsh and the other with mixed coal or North Country coal—and sent across the Atlantic, and then it would be seen which was the better; but a trial of five or six hours was not sufficient. The experience of the world showed the superiority of the Welsh coal. The great steam companies never dreamt of using these mixtures: they got the best coal, and that was the Welsh. What happened at the measured mile? Had his right hon. friend ever heard of a vessel taken to the measured mile to be tried and any other coal used but Welsh coal? (Hear, hear.) But this was what was done:—They tried a vessel at the measured mile, she made her 14 or 15 knots an hour, and then they put this inferior coal on board and immediately brought down her speed. (Hear.) All things being equal, and there being a saving of 12 or 15 per cent. by the use of Welsh coal, there must be some very strong reasons indeed to justify the use of any other. This was a time when it was important that the ships of Her Majesty's navy should be placed in the very best position. When this kind of unnatural alliance was forced upon them they must protest against it, and he trusted the right hon. gentleman would grant a divorce from an alliance which they detested and abhorred. (Hear, hear.)

Mr. CHILDERS said his hon. friend had asked "Why struggle against Nature? What has induced you to take one kind of coal when you can get another?" The answer was very simple. The particular district which his hon. friend represented produced only about 1-50th of our coal, and it would hardly be wise to exclude the rest of the country, which produced 49-50ths. Unless, therefore, it was shown to be absolutely necessary to go to this small district exclusively, he should not wish to give it a monopoly. The debate, however, was premature. Certain experiments had been made, and immediately on their completion he laid upon the table an abstract of the reports with a note stating that they had been presented without tables or sketches, as these would take some time to print, but in the course of a few days the tables and sketches would also be produced. Subsequently the right hon. gentleman the member for Tyrone gave notice that he would move for returns for the last six months showing the opinion of the different officers about the Welsh and mixed coal. The six months were only just up, we were now in the month of July, the returns were up to the end of June, and his right hon. friend saw it was impossible to bring on the subject this year, so he postponed it until next session. But now the hon. member for Merthyr challenged the Admiralty to prove their case upon returns which were not before the House. His hon. friend the member for Merthyr and his hon. friend who had last spoken had been good enough to say that in the orders the Admiralty had given about the coal they had endeavoured to carry out those pledges of economy with Her Majesty's Government had given on coming into office, but they had not done so in a wise manner. He thanked his hon. friends for that statement. This controversy as to the coal was an old one. The object of the Admiralty was simply to avoid if they could being forced to draw their coal from a very small district. Being anxious to go into supply, he would make his remarks as brief as possible. The class of stokers had been spoken of somewhat disparagingly in connection with that subject, but they were really a body of men to whom work of that kind might be properly intrusted. The experiments to which the hon. member for Glamorganshire had alluded were only two single and almost off-hand experiments, conducted by Capt. Rice in May, 1869, when the changes in the furnaces had not been made, whereas if he would refer to the subsequent papers he would see that the experiments carried on under the Chief Inspector of Machinery Afloat were 110 in number, and extended over 14 months, from May, 1869, to July last. As far as their experience up to the present time went, the reports were conclusively in favour of the course which had been provisionally taken of purchasing one-third of North Country coal and two-thirds of Welsh coal. According to the accounts they were receiving from all the foreign stations, the Welsh coal deteriorated far more rapidly than the North Country or the mixed coal, and with Welsh coal it was more difficult to get up and keep up steam. The Government had not the smallest objection to lay on the table all those most valuable half-yearly returns, and would be perfectly prepared next year, when the House would have more information in its possession, to discuss that question fully. The hon. member for Merthyr had observed that at the present time—for reasons which he hinted at rather than named—it was particularly important that they should have the best coal they could get, and which produced the smallest amount of smoke. All he could say on the part of the Government was that they were quite alive to that consideration, and would be very cautious not to be led astray by temporary experiments in a matter of that kind into doing anything which would be prejudicial to the navy. (Hear.) He did not intend by that that the policy recently adopted on this subject would be reversed. He merely meant that the Admiralty had no object in view but the public interest and the efficiency of the navy.

FOREIGN MINES.

PESTARENA UNITED (Gold).—The directors have received the following telegram from Pallanza:—"Gold forwarded for the month of July, 648 ozs., from 989 tons of ore, and 26 working days."

— Thomas Warne, James Roberts, July 25: Aquavite Mine: The end driving south in the adit level, on No. 2 lode, yields 2½ tons of ore per fathom, worth 8 dwts. per ton. The 23 end driving south yields 9½ tons per fathom, worth 9 dwts. per ton. The 23 end driving north yields 5 tons per fathom, worth 10 dwts. per ton. The 33 end driving south has undergone a considerable change. We have reached in this end an open cleavage dividing the two rocks; the broken rock which has so long disordered the lode in this end will apparently soon wear it out. The 46 end driving south yields 6 tons per fathom, worth 1½ oz. per ton. This end is opening up rich ground. The 55 end, driving north from winze, yields 3½ tons per fathom, worth 1 oz. per ton.—Boundary: Here we have suspended the end driving south in the 10, and shall commence a stope in back of it, where we estimate the lode to yield 3½ tons of ore per fathom, worth 15 dwts. per ton.—Peschiera Mine: The end driving north in the 33, on the western part of No. 2 lode, is opening out stoping ground, to expectations yielding 5½ tons of ore per fathom, worth 12 dwts. per ton. The end driving south on this lode yields 3 tons per fathom, worth 9 dwts. per ton. We shall communicate this end to other workings in 5 metres sinking, for the purpose of having an increase of air, so as to enable us, after the communication, to put on a pair of men stoping on this lode. The end driving north in the 33, on No. 5 lode, yields 3½ tons per fathom, worth 9 dwts. per ton. The 65 end, driving north from cross-cut, has been the past week yielding some rich stones of auriferous pyrites. All the stopes on an average continue their full value as when last reported.—Surface: Nearly all the supports for carrying launders required for the new watercourse have been put up, and the launders are now being made.

WEST CANADA.—F. Williams, July 12: Huron Copper Bay: The lode in Stephens's winze, sinking below the 35, east of Palmer's shaft, yields about 2 tons of ore per fathom for the length of the winze (9 feet). I am glad to say the ground in this winze is much easier for sinking through than it was last month, and that we are now making good progress. The stope in the east of this winze, below the 20, is not changed, and still yields 2¾ tons per fathom. The men belonging to this stope have been engaged during the past eight or nine days in putting in a stull that was necessary to secure the north side. The stope in the bottom of the 35, east of Palmer's, yields 2 tons per fathom. The stope below the 35, east of Bray's, produces 2¼ tons of ore per fathom. The stope east of this shaft, and west of Carmichael's winze, below the 20, is worth 2¼ tons per fathom. The lode in the 50 yields from 3 to 3½ tons per fathom. The stope west of shaft produces over 2 tons per fathom. The lode in the 60, west of Palmer's shaft, is still very poor, but it looks more promising than a week ago, and I have no doubt but that it will soon prove productive again. The lode in the 60, east of Bray's, yields 2 tons per fathom. Bartle's winze, sinking below the 50, east of Bray's shaft, is not changed, and still yields 2 tons per fathom.—Wellington Mine: The stope east of Rowe's shaft yields over 3 tons of ore per fathom; the stope west is worth 2¾ tons per fathom. The stope over the 35, east of Bray's shaft, yields fully 3 tons per fathom. Everything connected with the dressing is going on satisfactorily.

[For remainder of Foreign Mines see to-day's Journal.]

LORD ABERDEEN AND LORD PALMERSTON ON BLOATED ARMAMENTS.—LORD ABERDEEN: I am disposed to dissent from that maxim which has been so generally received, that "if you wish for Peace you must be prepared for War." It may have applied to the nations of antiquity, and to society in a comparatively barbarous and uncivilised state, when warlike preparations cost but little; but in the state of society in which we now live, and when the war-like preparations of great powers are made at an enormous expense, I say that, so far from their being any security for peace, they are directly the contrary, and tend at once to war; for it is natural that men, having adopted means they think efficient to an end, should desire to put their efficiency to the test, and to have some direct result from their labour and expense.—LORD PALMERSTON: It is quite true it may be said, What are opinions against armies? My answer is, opinions are stronger than armies. Opinions, if they are founded in truth and justice, will, in the end, prevail against the bayonets of infantry, the fire of artillery, and the charges of cavalry.

London: Printed by RICHARD MIDDLETON, and published by HENRY ENGLISH (the proprietors), at their offices, 26, FLEET STREET, E.C., where all communications are requested to be addressed.—*August* 6, 1870.